It's a Small World

by EDWARD J. STACHURA

Almost everyone agrees that a person is the best available authority of the subject of his personal experiences. It doesn't matter whether it is of the kind which is a record of the mistakes he's made, or whether it is that which has contributed toward his personal development and edification through the study and appreciation of others is so far as he has adopted them as parts of his own experience.

At best, no one has more than a "smattering of experience" which he tells to others. Listed foremost in my book of experiences is the awakening that came about many times because of certain "cockeyed" ideas I have had. Josh Billings used to say, "What we don't know don't hurt us nearly so much as knowing a lot of things that ain't so!" In my own case it has happened many times, but I'll give you just two examples.

First, there is the cockeyed idea I had for many years that a transformer always reverses the polarity of a circuit. That is, if two windings are wound in the same direction, and I don't reverse the leads during my test, the instantaneous voltage across the secondary winding will be just the reverse of the applied voltage.

So certain was I about this that when a friend suggested that it was not so, I defended this idea with great vigor. I even resorted to the citation of passages from text books, stated Lenz's Law, and every device that I could muster. I am happy to say now that truth prevailed and that I have been enlightened. I also found that the text books and Lenz were "OK", it was my interpretation that was "all wet."

Since my enlightenment about the transformer, I found to my amazement that at least fifty percent of the people I talked to had the same idea. Included were several PhD's. In each case I noticed the same resentment, the same fight to defend a "cockeyed" idea. This particular experience convinced me that people really are funny. It's Newton's first law of motion all over again . . . inertia . . . applied to people. I like to think of Newton's law in the manner that I once heard K. L. Hansen put it: "All matter is pig-headed".

Another half-cocked idea that I've had, which is pertinent, has to do with the input circuit to a radio receiver where it is inductively coupled to an antenna . . . that is, the input of the first radio frequency stage of a receiver. I picked up the idea at the time when I was first finding out about series and parallel resonance. For about five years I regarded it as a parallel resonant circuit. Perhaps no one really tried to convince me otherwise, but I was truly surprised to learn one day, while reading a paper in the *IRE Proceedings*, that this was really a series resonant circuit when viewed from the induced voltage.

These are two mild instances . . . there are more but I don't care to talk about them. I am convinced that it has happened to the best of us if we only would admit it. To support this, let me cite an instance or two in which some pretty "big time" people have been wrong.

Aristotle, that worthy Greek philosopher, deduced by pure reasoning that it was only reasonable that heavy objects should fall to earth faster than lighter objects having the same shape. It was several hundred years after Aristotle's "reasoning" that Gallileo came along and proved, by his Tower of Pisa experiment, that it was not so. And what do you suppose happened? Why naturally, everybody got mad at the fellow and actually went right along believing in their own way for some time thereafter.

Another instance that I'd like to cite has to do with that wonderful method of broadcasting, FM. In the early days of radio broadcasting, which had its beginnings in Dr. Frank Conrad's garage in Pittsburgh back in 1920, it was recognized that only a limited number of broadcasting stations could be accomodated within a given band of frequencies. It was proposed that using frequency modulation rather than amplitude modulation might provide elbow room for additional stations . . . that is, by limiting the frequency swing of each station, say to about three kilocycles, there would be much more room available.

Edward J. Stachura

When this was tried it was found that something crept in and things didn't work out as expected. It was then that Dr. Carson, noted mathematician and telephone engineer, dealt what was considered to be a death-blow to FM. He proved beyond any question, by rigorous mathematical processes, that FM would always require more space than the equivalent AM station. And he was right . . . he was right in so far as he went.

The fallacy of using FM was exposed, it was rejected as having little value and even as being harmful. It was rejected by most of the experts, but Armstrong had other ideas — going against the thinking of the art — the accepted notion —he developed a system of wide-band FM which is today firmly established as superior to AM in many respects. I repeat, Dr. Carson was right—right as far as he went with his analysis; and this reminds me of some advice that the great Edison once gave a young man: "When everyone says a thing can't be done, when they prove by mathematical methods that it is impossible, you are on the verge of a great discovery.

In reading about the great discoveries in physics, I was surprised to learn that toward the latter part of the 19th Century physicists regarded the field as exhausted. One scientist of note, making an address back in 1893, said it was probable that all the great discoveries in physics had been made and that the physicist of the future would merely recheck the experiments of the past.

And then it happened! Within a few years the Atomic Age had its beginning with the discoveries of Becquerel, Crookes, Roentgen, The Curies, the experiments of Lord Kelvin, Sir Rutherford, and the theoretical work of Bohr, Lorenz, Einstein and others.

The moral of this and similar accounts is that these forecasts of saturated fields of endeavor, lack of opportunity, and other bleak predictions are a lot of "malarky".

Mr. C. A. Boddie, a friend and asso-

EDWARD J. STACHURA completed his studies at MSOE in 1934 and joined the Faculty that year. In 1942, he left to enter the Army Signal Corps, first as Superintendent of a Radio School and later as Radio Engineering Officer. At present he is Patent Advisor to the Signal Corps in Washington. A radio ham since 1928, he delivered this talk at the dedication of MSOE's amateur station, W9HHX, during the 1949 Homecoming.

ciate of mine, who is himself an engineer of considerable talent (with about 90 patents on all phases of control circuits and vacuum tubes to his credit) related to me, during one of our many conversations, experiences he had with the great Terrill, inventor of the voltage regulator which bears his name.

The one thing that impressed me most in the description of Terrill's habits was his attitude toward making connections during his experiments and tests. I am told that he was most painstaking in twisting every lead properly about the terminals, tightening the screws and nuts with care so that each connection was foolproof. When something went wrong, didn't turn out right, or failed to operate, he never had to recheck his connections. He knew they were right.

That brings out something I'd like to impress upon you. If something has to be done, do it right—certainly it is important enough to be done correctly. There is no room in the engineer's life for slip-shod, half-baked ways of doing things. If a thing has to be done, no matter how trifling it may at first appear to you, do it right. It leads you to develop good working and living habits which, in the long run, will pay terrific dividends.

Doing things right is fun—makes you feel good and clean inside—doing things wrong and short of right is bad for your job—for your conscience. Doing things right will develop in you a sense of responsibility without which you will be hopelessly lost in all phases of living.

Personal experiences fall into many patterns. One group of mine have been, for the most part, pleasant, profitable, and have contributed much to my personal well-being. These are my experiences with amateur radio.

I've been a ham for about 20 years. In my early days of ham radio, I communicated with W9SO, then the Milwaukee School of Engineering Radio Club, and often talked with Bill Gainer. My call was W3BLU. Needless to say, when I came to MSOE I was not without friends. Amateurs never are, it matters not where in the world they may be.

Later, at MSOE, I was fortunate enough to pick up where W9SO left off and we had a station with the call, W9JUE. My most recent experience of note had to do with my recent trip to Milwaukee and my visit at W9HHX, your MSOE ham station. As soon as I return to the air, I hope to have many pleasant contacts from my present station, W4ALJ.

Every amateur or "ham" as he likes to be called, dreams some day of having a "Shack" just for his gear; he dreams about running a full-gallon (a kilowatt of power); he dreams of operating on all bands; and he dreams of being a credit to amateur radio.

As a hobby, amateur radio requires the greatest amount of technical know-how and knowledge of the medium. It cannot be indulged in without considerable study, practice, and enthusiasm. Once the skills are acquired, amateur radio provides a life-long interest.

The word amateur is from the Latin "amator"—lover. Thus a radio amateur is a person who takes part in the radio art for the sake of the pleasure afforded by the occupation itself and for no pecuniary gain whatsoever.

Thousands upon thousands of hams have trained themselves in the intricacies of radio communications and qualified for the Federal Amateur Radio license granted by the F.C.C. Many students at MSOE are training through their club today and some already have been granted their "ticket".

Not only has the ham contributed greatly to the present development of the radio, but he also has been available to play his part in emergencies that cut off communities from contact with the outside world—except by radio.

(Continued on page 48)

It's a Small World

(Continued from page 12)

Some of our outstanding men in radio have been and are amateurs: Dr. Frank Conrad, broadcast pioneer; General LeMay of World War II and B-29 fame; men in sports like Wilmer Allison, Davis Cup star; and many others in all walks of life.

During the war, I had the pleasure of working with Dr. Beverage, vice-president in charge of Research and Development, of RCA Communications, Inc. He was most enthusiastic in his praise of "hams" — you should have seen him copy the code during some of our tests!

In my earlier days, I had the good fortune to be around Dr. A. Hoyt Taylor, credited by many as one of the discoverers of the underlying principles of Radar. In those days the Naval Research Laboratories, at which Dr. Taylor worked, were known as the "Playground of Skip Distances". Radio amateurs assisted materially in the many tests made in those days.

I am delighted that MSOE, once again, has a radio club, a first rate ham station, and that I was afforded the opportunity to take part in the dedication of W9HHX.

In conclusion, I would like to say a few words about piggy banks. All of you are familiar with the piggy bank. It is a hollow device having a slot along the top, and is usually in the form of a pig. Piggy banks, however, can have any shape — a tobacco tin, a can, a cigar box — the object is always the same.

The idea is to put coins — loose change — into the piggy bank for the purpose of accumulating or saving up a sum of money. Suppose a person frequently drops coins into his or her piggy bank — sometimes pennies, sometimes nickels and dimes, sometimes more. After a certain period of time when piggy is broken open, and you have fed him regularly, you'll find a considerable sum of change, usually more than you expected. But don't fool yourself—you get out only what you put in.

Suppose another person starts out with a piggy bank and the first day places a penny in it—then, through being too busy, or forgetful, never adds anything more to it. Then one day he breaks piggy open. What does he find? A single red cent, not one penny more — after all, that's all he put into it.

That's life. You get out only in proportion to what you put in. It's up to you. Get in there and pitch!